

Getting Kura Clover Established in Pastures

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Kura clover passed yet another tough winter test as other forage species faltered this past winter. The cold, open winter resulted in winter injury to a number of perennial forage species including alfalfa, red clover, orchardgrass, and ryegrass. However, Kura clover appeared to be completely unaffected by the harsh winter, once again proving its excellent winter hardiness in Minnesota. The exception was where ice sheeting occurred, under which few plants species of any kind can survive; there, Kura clover was injured.

Pastures are more productive and profitable when they include a legume; but persistent, productive legume options are limited, and some farmers allow the fear of bloat to rob them of the profit potential of grazing legume-grass mixtures. Kura clover has proven to be an ideal legume for grazing, and its use in renovating and developing new pastures in Minnesota should be seriously considered. Among its positive attributes for pasture are: excellent winter hardiness, persistence under a wide range of grazing management, good nitrogen fixation once established, and high quality and animal performance potential. Wisconsin researchers recently reported gains of over 2.6 lb/head/day and 900 lb/acre/year for Holstein steers grazing kura clover-grass mixtures for 3 years in southwestern Wisconsin. Negative attributes of Kura clover include susceptibility to potato leafhopper, bloat potential, and low seedling vigor. The low seedling vigor is the subject of the research results shared in this article.

Kura clover is slow to establish and thus susceptible to competition during the seeding year. Thus, early attempts to introduce 'Rhizo' kura clover into grass pastures via broadcast seeding and limited grass suppression were generally met with failure and disappointment. However, we have recently refined methods to suppress existing pasture grasses to enable establishment of legumes. In addition, we have found that, in contrast to other legumes, Kura clover fixes little nitrogen during its seeding year when inoculated with currently available commercial inoculant, and thus may be nitrogen deficient during establishment. Newer, more vigorous varieties like 'Endura' and 'Cossack' are now available as well.

Because of these recent developments, we began a series of pasture renovation experiments in Minnesota and Quebec, Canada, in spring 2001. The objective of these experiments was to determine the influence of herbicide suppression of grass pastures in combination with N fertilization on the establishment success of Kura clover no-till drilled into pastures compared to red and white clover. Cossack and Endura Kura clover at 10 lb/ac, 'Scarlet' red clover at 9 lb/ac, and 'Shasta' white clover at 3 lb/ac were no-till drilled into grass sods in May, 1-2 days after suppressing the existing grasses with either 1.5 pt/ac paraquat, 1 qt/ac glyphosate, or 4 qt/ac glyphosate when spring grass growth was 3 to 5 inches. All combinations of these species and herbicide treatments also received either 0 or 100 lb N/ac, with 60 lb N/ac applied at seeding and 40 lb/ac after the first seeding year harvest. No N was applied after the seeding year. Grass sods were mostly mixed tall- and short-grass sods comprised of smooth brome grass, quackgrass, reed canarygrass, and/or Kentucky bluegrass.

Results have varied, but have generally been successful for introduction of Kura clover into these grass pasture sods. However, Kura clover has demonstrated its typical slow rate of establishment and contribution to pasture yields. Seeding year clover yield and percentage in the pastures were greatest for red clover, intermediate for white clover, and least for Kura clover (Figure 1). And for all clovers, yields have been greatest when the grass sod is killed with glyphosate and least when suppressed with paraquat. In Minnesota, seeding year N fertilization increased seeding year grass, weed, and total pasture yields, but decreased clover percentage, resulting in reduced clover yields and percentages the year after seeding. However, in Quebec, seeding year N fertilization doubled Kura clover yields the year after seeding. The establishment years in Quebec were much drier than in Minnesota, so this difference in response to seeding year N may be associated with rainfall patterns.

When suppression rates of herbicide were used, Kura clover yields and percentages in grass pastures increased to desirable levels, averaging about 45% of pasture yield the year after seeding (Figure 2). Clover content in all other treatment combinations has been higher than desired the year after seeding, often exceeding 60%, suggesting that less suppression and/or lower seeding rates may have produced more desirable grass-legume pastures. However, the injury and death caused by this past winter really changed the complexion of spring 2001 seedings. Percentage clover in mixtures in June 2003 are shown in Table 2. Both red and especially white clover experienced significant winter injury and thus were less present than Kura clover, which was unharmed by the past winter.

Table 2. Percentage clover in pasture plots at Rosemount, MN, in June 2003, two years after no-till drilling into grass pasture sods (averaged over 3 herbicide and 2 N fertilization levels applied in establishment years).

Clover no-till drilled	Bluegrass sod	Bluegrass-bromegrass sod
	----- % clover -----	
Endura Kura clover	64	36
Cossack Kura clover	75	41
Scarlet red clover	37	26
Shasta white clover	18	14

At this point, the value of seeding year N is not clear, but the benefit of herbicide suppression is. Consider renovating grass-dominant pastures next spring with Kura clover. Now is the time to control broadleaf weeds and correct fertility deficiencies before introducing Kura clover next spring. Grazing heavily this fall may help to suppress the existing grass. While tight grazing this fall and early next spring MAY be a potentially viable approach to suppress the existing grass without herbicide, we have not tried this. However, even a vigorous seedling like red clover does not always establish successfully using this approach, so this approach is probably too risky with Kura clover.

Herbicide rates and seeding rates, however, could likely be lower than we used in our trial. At Morris, we have had success with this technique using ~0.65 lb ai/acre of glyphosate on bromegrass pastures when they are ~4 inches tall. Kura clover seeding rates less than 10 lb/ac could probably work as well, but be sure seed is inoculated with Rhizobium specific to Kura

clover. In bluegrass-dominant sods, it may be best to no-till seed a few pounds per acre of some vigorous bunch grass seed (orchardgrass and/or ryegrass) together with Kura clover, since bluegrass pasture sods can become dominated by Kura clover, and thus be too high in legume content. A couple pounds of red clover might increase seeding year legume content as well.

Figure 1. Influence of clover and herbicide suppression on establishment year clover percentage in no-till drilled bluegrass pasture sods at Rosemount, MN, in 2001.

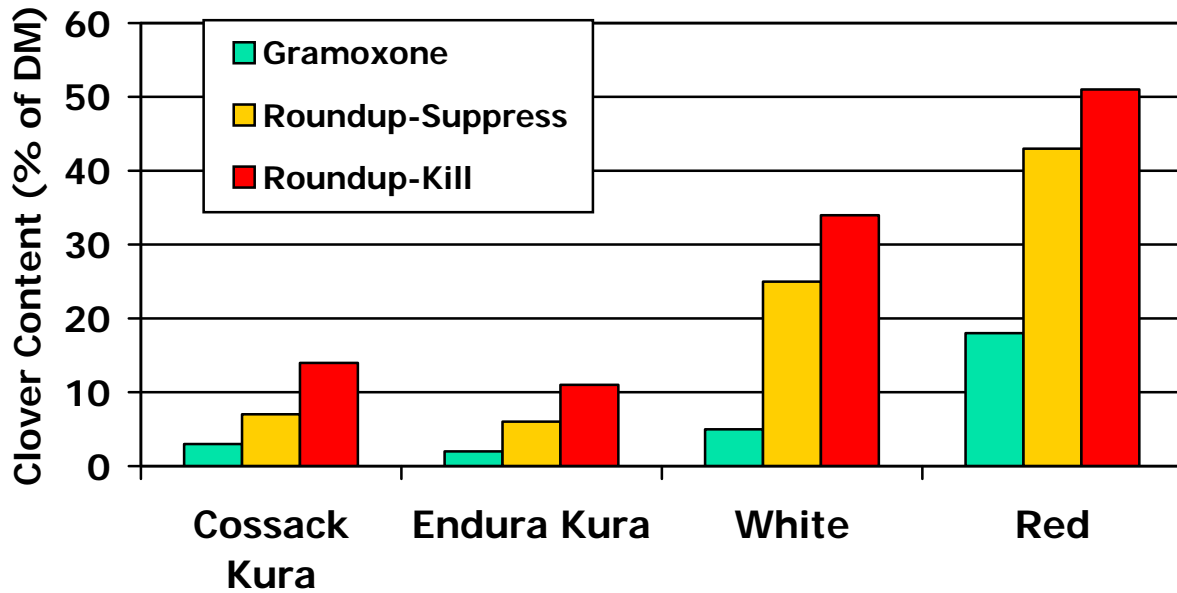


Figure 2. Influence of clover and seeding year (2001) herbicide suppression on season average clover percentage in bluegrass pasture sods the year following no-till drilling with clover (2002) at Rosemount, MN.

